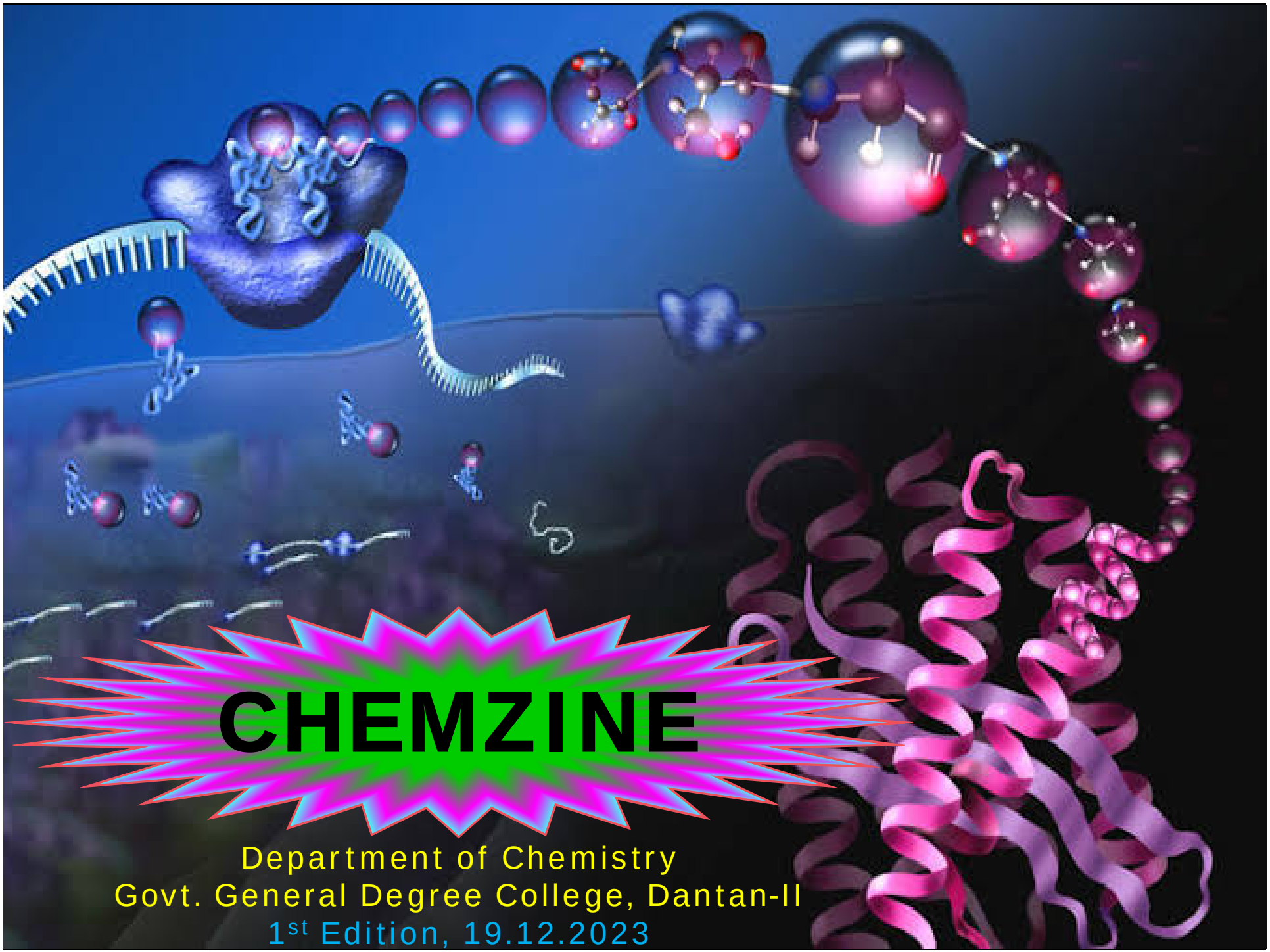


CHEMZINE

Department of Chemistry
Govt. General Degree College, Dantan-II
1st Edition, 19.12.2023

Prepared by

5th Semester Students

Department of Chemistry

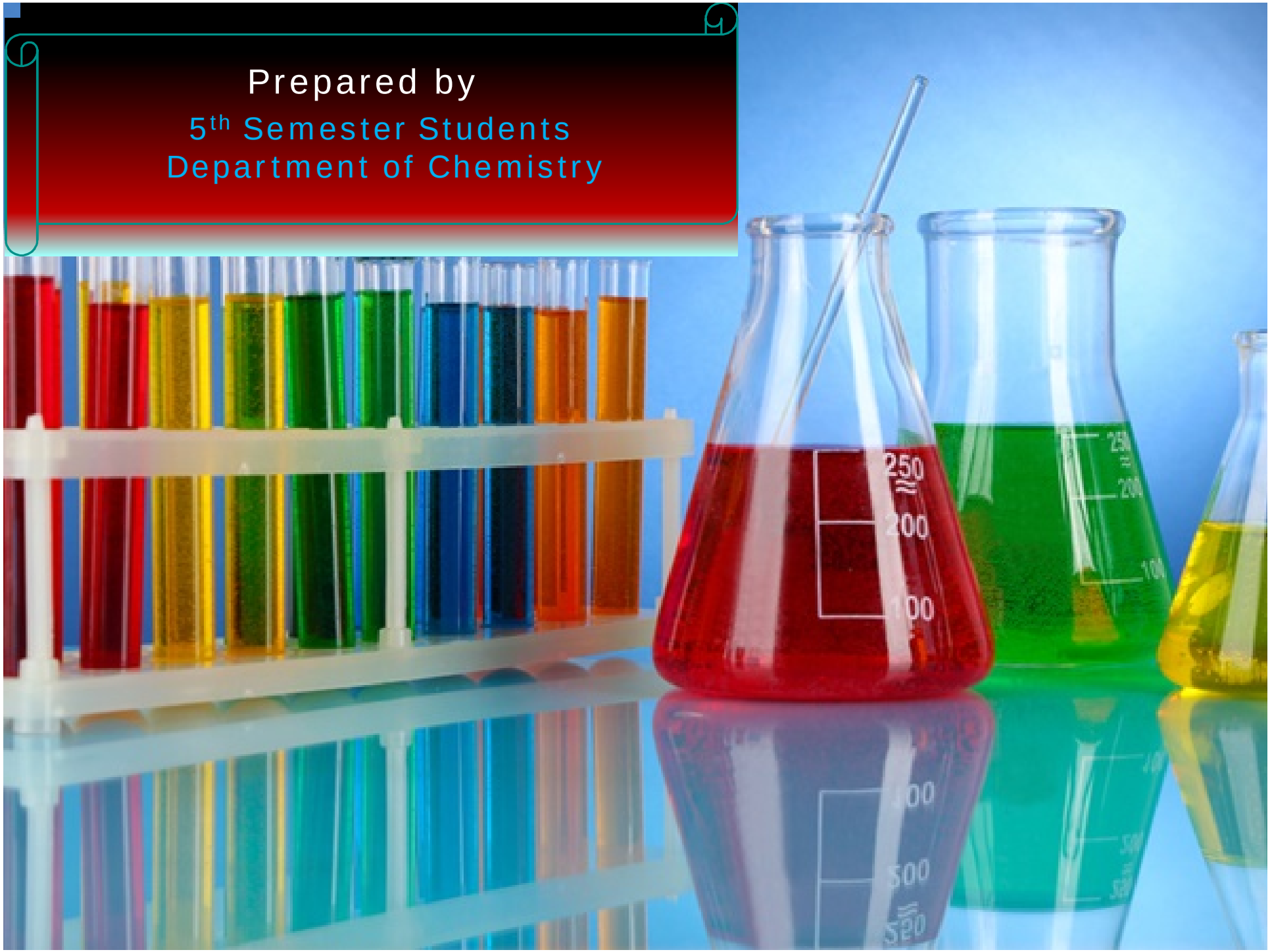


Table of contents

CHEMISTRY IN EVERYDAY LIFE

--- Pousali Maity
2019-2022 (Gold Medalist)

Chemistry is the branch of science which deals with the investigation of the properties and changes of matter. Human beings are surrounded by chemistry. Chemistry greatly influences our everyday life. You find chemistry in foods, air, cleaning chemicals, your emotions and literally every object you can see. The wonders of Chemistry are in the brilliant chemical reactions that happen in the human body. Its wonders lie in the air we breathe and the food we eat. Let us find out some of the glimpse of chemistry in our everyday life.

Toothpaste

We are using many kinds of toothpastes like Colgate, Pepsodent, Sensodent, Close up, Dabur Red etc. These are made of chemicals like chloride, fluoride, saccharine , aspartame, parabens, sodium lauryl sulfate, Propylene glycol etc .

Sopes and Detergents

Soaps are sodium or potassium salt of higher carboxylic acid such as stearic acid, palmitic acid and oleic acid, whereas detergents contain a long chain of alkyl groups. Detergents, in comparison to soaps, can also function in hard water.

Preservation of food

Food preservatives protect food from bacteria and other microorganisms. Salt and edible oils are two main preservatives which are used since ages to prevent microbial growth. Other synthetic preservatives include vinegar, sodium benzoate, sodium metabisulphite, etc.

Cosmetics

Cosmetics play vital role in the appearance of our body. Lipsticks, oils, beeswax, perfumes, nail polish mascaras are commonly used and they contain chemicals that can harm us too. They Contain polymers, solvents, grease, petroleum oils, colorants, pigments etc.

Drugs and medicine

Medicines are chemicals which used to cure and prevent disease. Advances in medicines have enabled doctors to cure many diseases and save lives. Some medicines are made in labs by mixing together a number of chemicals. Others, like penicillin are byproducts of organisms such as fungus.

Household cleaning products

Various household cleaning products are used for cleaning purpose of surfaces. These are available in solid , liquid and gaseous forms . Common Chemicals are used for preparation of these products are hypochloride, alcohols, chlorine di oxide, hydrogen di oxide etc.

Agriculture

Agriculture provides most of the world's food and fabrics. Cotton, wool and leather are all agricultural products. We use fertilizers and insecticides to increase the fertility of the soil and protect crops from pests, rats and Locusts. Fertilizers and insecticides contain chemicals like hydrogen cyanide, naphthalene, nicotine, methyl bromide etc.

In conclusion, chemicals are the fundamental components of everything. Chemical molecules make up all foods including vitamins, lipids, proteins and fibre. The study of chemistry, a special branch of science, is necessary for the research of materials or their development for the benefit of humanity. Without chemistry, our life is impossible. So it is a must for everyone to learn and enjoy. Hence effective and good use of chemistry is the need of this modern technological world.

----Soumen Giri
(2016-2019)

"Various colours of Indian culture will provide immense pleasure and may cause anyone to forget everything. To maintain our pride, we Indians must band together and pledge to protect our motherland and culture from destruction. Being a Human, we always have to provide our contribution to our society. We love being Indians and will always be proud of our nation."

"Inventions, such as new tools, devices, processes, and medicines, have provided significant benefits to society. Inventions help people around the world live longer, healthier, and more productive lives and provide new ways to build, move, communicate, heal, learn, and play."

Research is a "creative and systematic work undertaken to increase the stock of knowledge". It involves the collection, organization and analysis of evidence to increase understanding of a topic, characterized by a particular attentiveness to controlling sources of bias and error. These activities are characterized by accounting and controlling for biases. A research project may be an expansion on past work in the field. To test the validity of instruments, procedures or experiments, research may replicate elements of prior projects or the project as a whole.

The primary purposes of basic research (as opposed to applied research) are documentation, discovery, interpretation, and the research and development (R&D) of methods and systems for the advancement of human knowledge. Approaches to research depend on epistemologies, which vary considerably both within and between humanities and sciences. There are several forms of research: scientific, humanities, artistic, economic, social, business, marketing, practitioner research, life, technological, etc. The scientific study of research practices is known as meta-research.

A scientist is a person who researches to advance knowledge in an area of the natural sciences.

The roles of "scientists" and their predecessors, before the emergence of modern scientific disciplines, have evolved considerably over time. Scientists of different eras (and before them, natural philosophers, mathematicians, natural historians, natural theologians, engineers, and others who contributed to the development of science) have had widely different places in society, and the social norms, ethical values and epistemic virtues associated with scientists—and expected of them—have changed over time as well. Accordingly, many different historical figures can be identified as early scientists, depending on which characteristics of modern science are taken to be essential.

Some historians point to the Scientific Revolution that began in 16th century as the period when science in a recognizably modern form developed. It was not until the 19th century that sufficient socioeconomic changes had occurred for scientists to emerge as a major profession.

Research Sections under Central Government

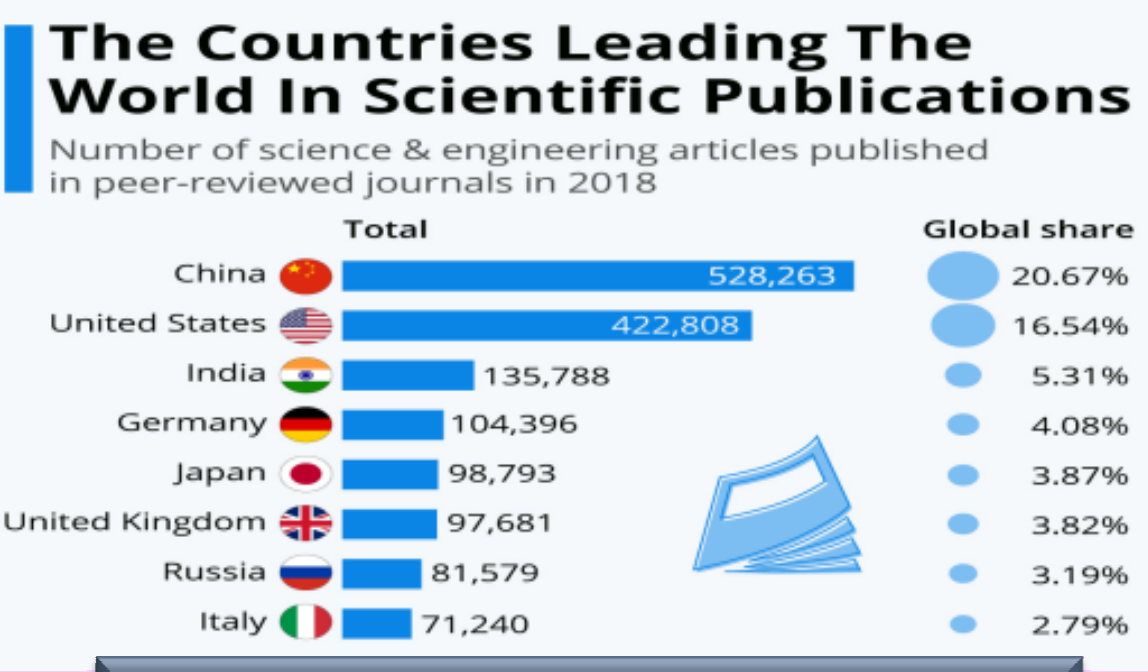

Types of Research Methodology
Quantitative Research
Qualitative Research
Descriptive Research
Analytical Research
Applied Research
Research Methodology
Fundamental Research
Exploratory Research
Conclusive Research
Surveys
Case Studies

Scientists in Chemical Research

- Agrochemist
- Analytical chemist
- Astrochemist
- Atmospheric chemist
- Biophysical chemist
- Clinical chemist
- Computational chemist
- Electrochemist
- Femtochemist
- Geochemist
- Green chemist
- Chemical laboratory technician
- Inorganic chemist
- Medicinal chemist
- Nuclear chemist
- Organic chemist
- Organometallic chemist
- Pharmacologist
- Physical chemist
- Quantum chemist
- Solid-state chemist
- Stereochemist
- Structural chemist
- Supramolecular chemist
- Theoretical chemist
- Thermochemist

Novel Achievements of Our Country

2nd world ranking in Space Research



3rd world ranking in Scientific Publication in Science and Technology

Conclusions

Research is one of the parts of our Nation. Without research, society will not progress. As Teachers, Doctors and many others are doing a great job for the progress of our Society, we as Scientists have an opportunity to contribute our contribution to Research. Soldiers do a great job and sacrifice for our nation. Our national space research organisation achieved a milestone in the world. This great work motivates one to do Research to explore our Innovative ideas, Capacity and Limitations.

HYDROGEN REVOLUTION-Fuelling tomorrow's world

--- Sayan Das
(2017-2020)

In the quest for sustainable and clean energy sources, hydrogen has emerged as a promising candidate. It offers a potential solution to our growing energy demands while minimizing environmental impact. Hydrogen, in its molecular form H_2, is abundant, and its combustion or use in fuel cells produces only water as a by product, making it an appealing alternative to traditional fossil fuels. This article delves into the chemistry behind hydrogen as a sustainable energy solution and its role in a greener future.

TYPES OF HYDROGEN (based on extraction method)

Grey Hydrogen: It is produced via coal or lignite gasification (black or brown), or via a process called steam methane reformation (SMR) of natural gas or methane (grey). These tend to be mostly carbon-intensive processes.

Blue Hydrogen: It is produced via natural gas or coal gasification combined with carbon capture storage (CCS) or carbon capture use (CCU) technologies to reduce carbon emissions.

Green Hydrogen: It is produced using electrolysis of water with electricity generated by renewable energy. The carbon intensity ultimately depends on the carbon neutrality of the source of electricity.

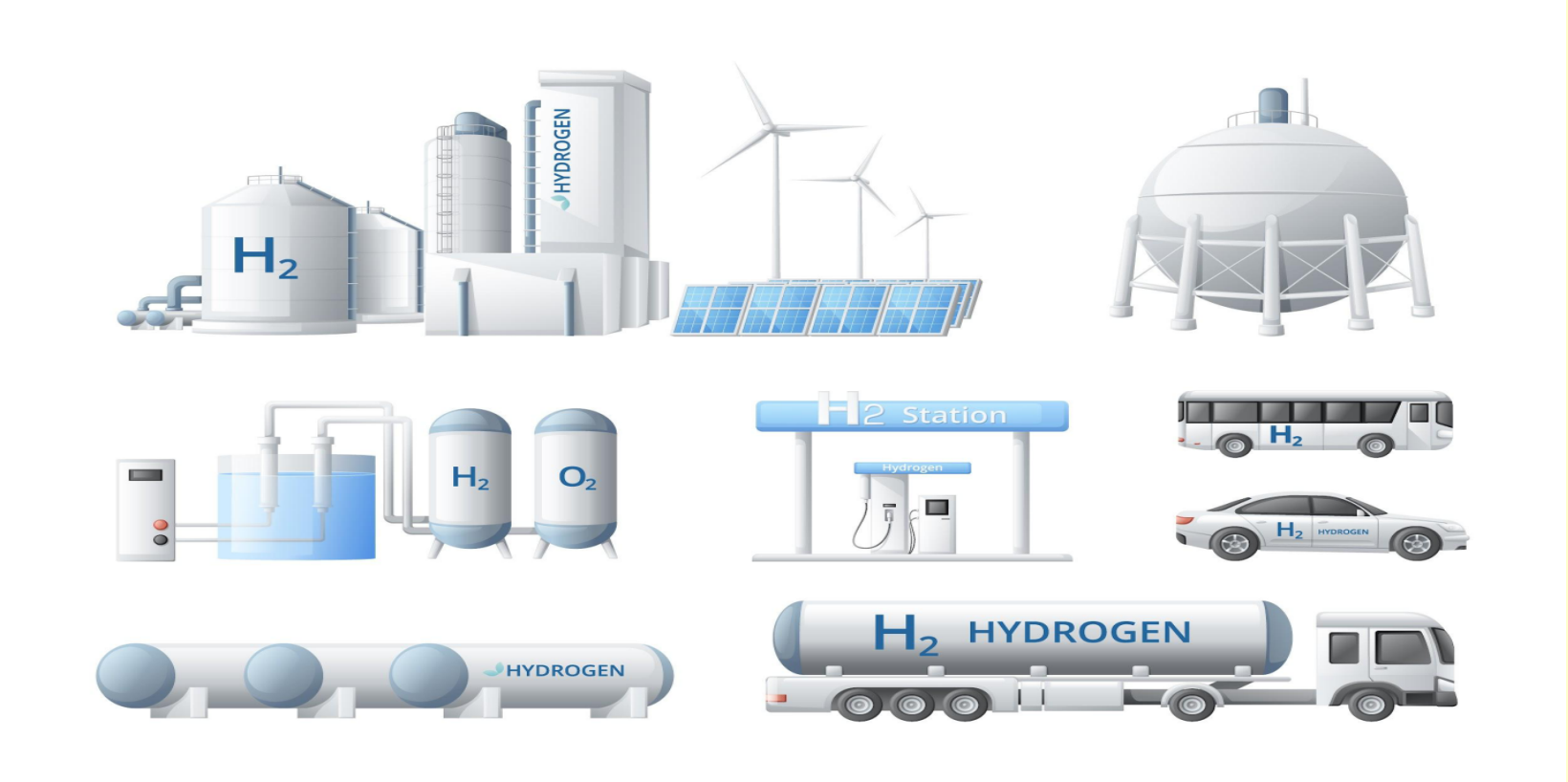
PRODUCTION

SMR Method: The most used method of hydrogen production for industrial purposes is the SMR method. This process involves reacting natural gas with steam to produce hydrogen and carbon dioxide.

$$CH_4+H_2O=CO_2+3H_2$$

Electrolysis: Electrolysis is a clean method to produce hydrogen. Electrolysing water by electrical energy produces hydrogen and oxygen.

$$2H_2O=O_2+2H_2$$



STORAGE

For using hydrogen as fuel in cells or hydrogen powered vehicles, storing safely and efficiently is a challenging process because of its low density and high flammability. The Following are some common methods for storing hydrogen.

Compressed gas: For vehicle use hydrogen can be stored in a high pressurized tank made with carbon fiber.

Liquid hydrogen: It can be stored as a liquid form by increasing density at extremely low temperature. It takes less space than gas form.

Metal hydrides: For storing and transporting hydrogen using metal hydrides is a safe process. Some metals like Titanium, Magnesium can absorb hydrogen by forming metal hydrides and later it can release hydrogen.

There are some other methods of storing hydrogen like using carbon nanotube, underground storage etc. The choice of storage method depends on the specific application and requirements.

CHALLENGES

There are some challenges and sustainability factors related to hydrogen fuel. Which are-

Production: At this time maximum amount of hydrogen is produced by using fossil fuel like natural gas, which is not a green process so it emits carbon. So, we have to focus on other method like electrolysis using renewable energy.

Cost: Hydrogen production, storage and transportation is very expensive. To make hydrogen as a primary fuel is very challenging.

Storage: Hydrogen storage and transportation is very challenging because of its low energy density by volume. So, we have to first develop a safe and efficient method.

Safety: Being highly flammable, first hydrogen should be handled very carefully.

Hydrogen fuel using as a green energy solution is very challenging and critical. First above challenges should be solved very quickly.

APPLICATION

Hydrogen fuel can be utilized in different way such as-

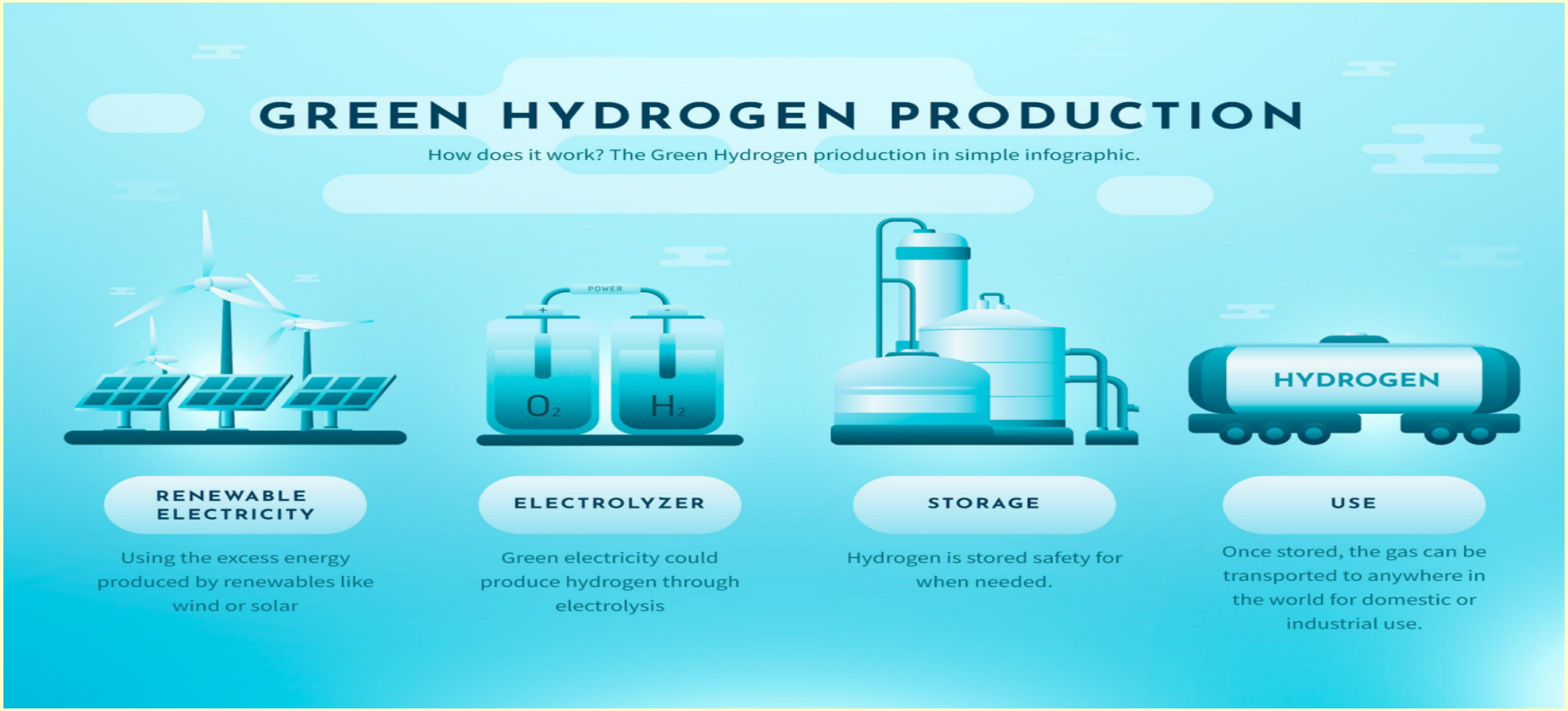
Transportation: Hydrogen fuel cells can power vehicles, including cars, buses and trucks. These vehicles emit only water vapor and heat making them environmentally friendly.

Electricity: Hydrogen can be used in fuel cells to generate electricity, either for grid power or as backup power sources for various applications such as data centers.

Energy Storage: Hydrogen can store excess energy from renewable sources like wind and solar. When needed it can be converted back to electricity through fuel cells.

Industrial Use: Hydrogen can be used for residential and commercial heating and cooling systems.

Hydrogen Blending: Hydrogen can be mixed with natural gas to reduce carbon emission.



GOVERNMENT POLICY

As a part of becoming energy independent by 2047 and achieving net zero Carbon emission by 2070, The Indian Government approved the National Green Hydrogen Mission on 4th January' 2022 with the intent of-

- **Making India a leading producer and supplier of Green Hydrogen in the world.**
- **Creation of export opportunities for Green Hydrogen and its derivatives.**
- **Reduction in dependence on imported fossil fuels and feedstock.**
- **Development of indigenous manufacturing capabilities.**
- **Attracting investment and business opportunities for the industry.**
- **Creating opportunities for employment and economic development.**
- **Supporting Research and Development projects.**

FUTURE PERSPECTIVE

The future of hydrogen fuel holds promise as a clean energy solution, especially in sectors like transportation and industry. Key developments to watch for include advancements in green hydrogen production methods, increased infrastructure for hydrogen refueling, and applications in fuel cell vehicles, industrial processes, and energy storage. However, challenges such as cost, infrastructure, and energy efficiency must be addressed for hydrogen to play a significant role in the future energy landscape.

CONCLUSION

In conclusion, hydrogen fuel presents a promising pathway towards a greener and more sustainable energy future. Overcoming technical, economic, and infrastructure challenges is essential to unlock its full potential and contribute to a cleaner and more sustainable energy landscape.

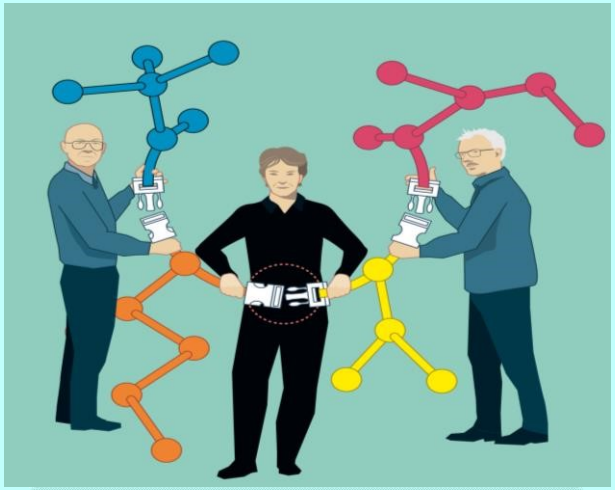
CLICK CHEMISTRY

--- Samaresh Maity
(2018-2021)

Scientists endeavor to generate substances by joining small units together with heteroatom links (C-X-C). The goal was to develop an expanding set of powerful, selective, and modular "blocks" that work reliably in both small- and large-scale applications. It is important to recognize that click reactions achieve their required characteristics by having a high thermodynamic driving force, usually greater than 20 kcal/mol.

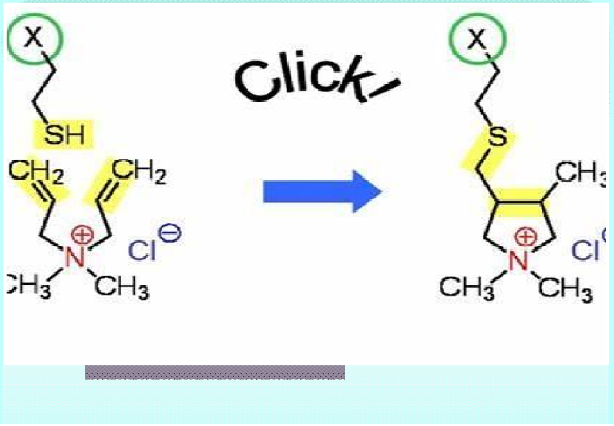
The concept of "click" reaction

The idea is that while trying to produce any particular compound or a complex molecule, one must look for starting molecules that easily react with each other. In other words, look for molecules that easily fit into each other, or 'Click' with each other



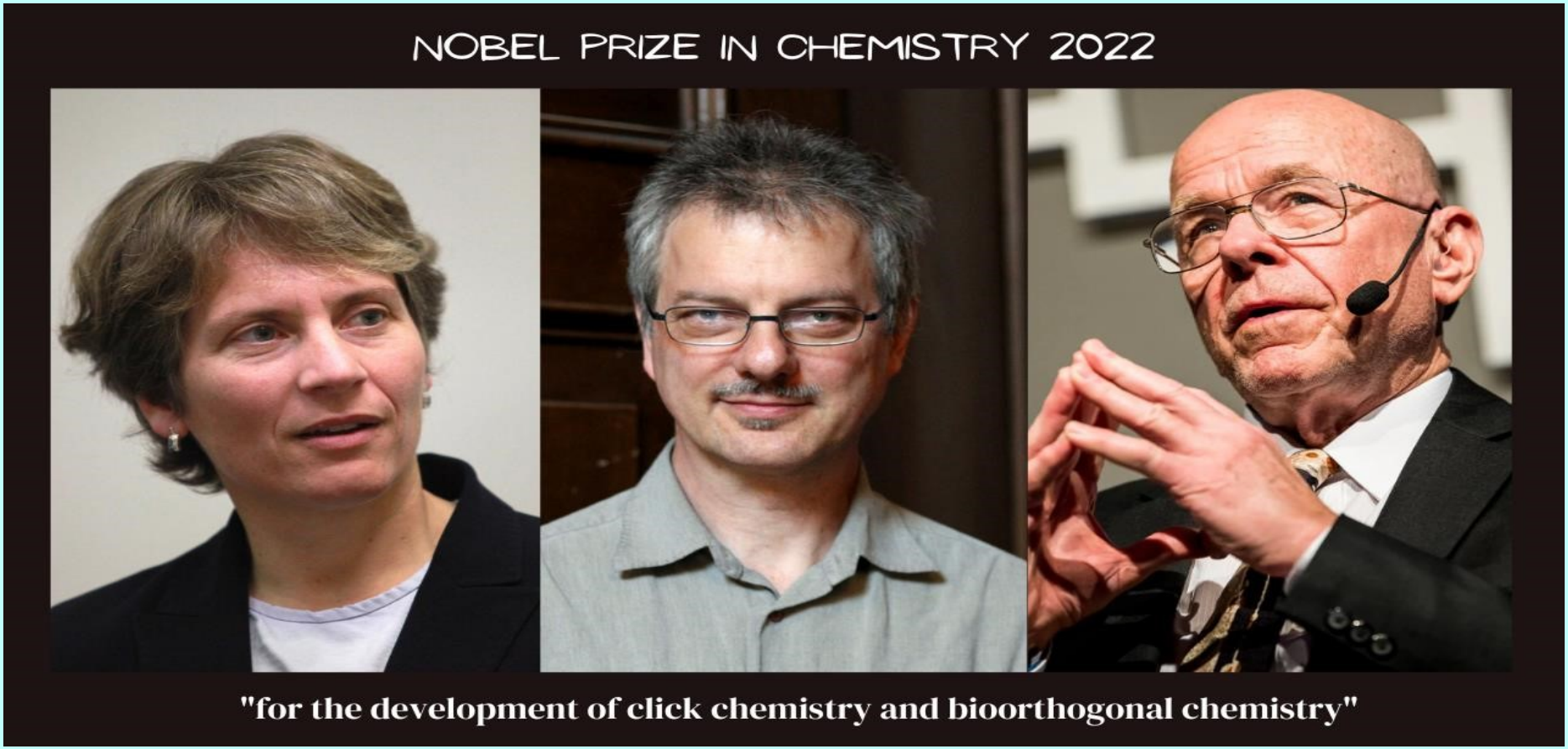
Click chemistry

Carolyn Bertozzi and Barry Sharpless of the United States and Morten Meldal of Denmark have been given the Nobel prize for developing the relatively recent field of 'click chemistry'.



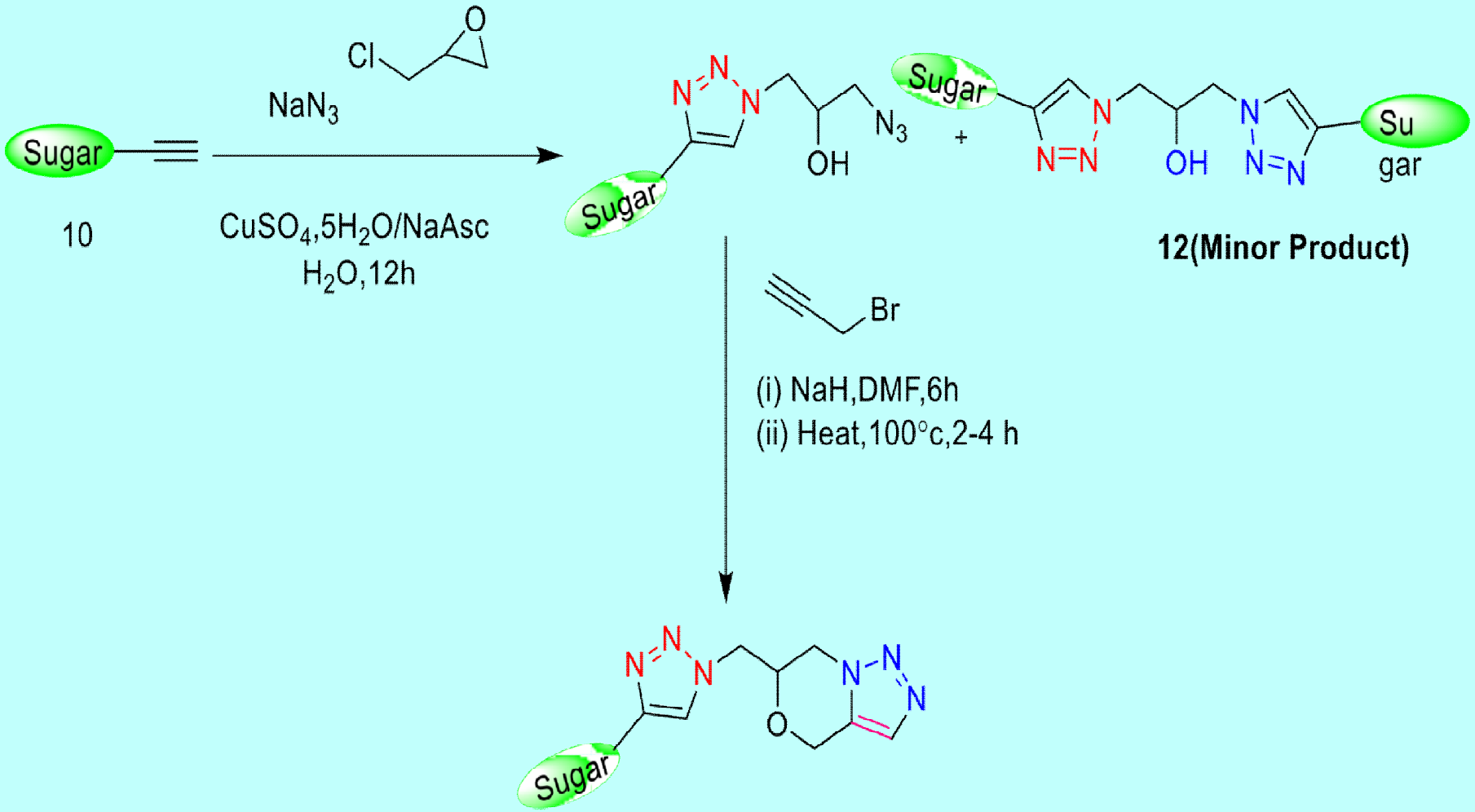
CRITERIA AND CHARACTERISTICS OF CLICK CHEMISTRY

The term “click chemistry”was first introduced in 1999 by Barry Sharpless at the 217th American Chemical Society annual meeting, and it immediately became a very popular topic. Sharpless reported a set of stringent criteria to define a reaction as a “click” reaction. The concept of “Click Chemistry” was launched with a set of criteria and characteristics for the process .



Criteria	Characteristics
Modular	Simple reaction conditions
Wide in scope	Readily available starting materials and reagents
High yielding	No or benign solvent (e.g. water) that is easily removed
Stereospecific	Simple product isolation
Inoffensive byproducts	High thermodynamic driving force (>20 kcal/mol)

Synthesis of Morpholine-Fused Triazolyl Glycoconjugates



CONCLUSION

Cu(I)-catalyzed 1,3-dipolar cycloaddition of an organic azide and a terminal alkyne (CuAAC or click chemistry) is a remarkably proven protocol for a facile access of simple to complex molecular structures comprising a 1,4disubstituted triazole skeleton with great efficacy and exceptionally high regioselectivity.

This "click protocol" has achieved huge significance in different fields such as chemical biology, polymer science, protein chemistry, material science, surface chemistry, supramolecular chemistry, microarrays, macrocyclization, sensing and detection of analytes, dendrimer and cluster synthesis, catalysis, lead optimization as enzyme inhibitors, radiolabeling, and many more.

There are huge progress in the use of the CuAAC click chemistry for the effective construction of a variety of functional carbohydrate structures toward the development of new therapeutic and diagnostic tools.

The subject is highly demanding and has great scope. This field can be explored certainly with an aid of carbo-click in coming years. Thus, it is very easy to draw a conclusion that this modular Cu catalyzed click reaction is more like an enriched ecosystem that offers extensive diversity, and its exploration in carbohydrate chemistry could open new dimensions for development of glycoconjugates of therapeutic importance.

Plastic Waste to Soap

--- Beauti Bhunia
1st Semester, 2023

It's the time to wash our hand of plastic trash, literally due to their non-degradable nature. Waste plastic made heap in the soil for many years, which affects soil fertility and degrades the soil quality. Plastic affects the drainage and sewerage system by blocking the pipes and the drains causing water logging.

About 60% of all plastics even made ends up in landfill or littering the environment only about one-tenth of plastic waste is ever recycled and much of that end up being low quality material reused in things like park benches.

So, chemists are searching for way to up cycle plastic into more valuable raw materials. Now there is way to turn old plastic into surfactants, researchers report in August'10 Science. Surfactants make up the key ingredients in dozens of products like lubricants, skin-wax, detergents and soaps.

Both surfactants and plastics (two most used polyethylene and polypropylene) are made of molecular chains of carbon atoms. Surfactant chains are shorter than that of plastics and are capped with groups of water-attracting atoms. To turn plastic into surfactants Liu and et. el developed a special reactor that carefully heat and condenses plastic into wax with short carbon chain. By capping the wax chain with groups of oxygen atoms and treating them with an alkaline solution, the researcher turned the wax into surfactants. Combining the surfactants with a bit of dye and fragrances tiny bars of soap are produced. For up cycling to be effective on a large scale, the final product must be valuable enough to cover the costs of the process and make it more economically attractive than alternative recycling options.

This research lays the groundwork for a new way to reduce waste by channeling used plastics into the production of other useful materials. Over time, we hope recycling facilities around the world will begin to implement this technique. If so, then consumers can expect to one day have the opportunity to buy revolutionary sustainable soap products that also lead to reduced plastic waste in landfills.

Food colours & additives : a taste of risk?

--- Tufan Maity
(2017-2020)

Colour has an important implication as far as food is concerned as it plays a major role in the taste and perception of food along with flavour and texture. It is a known fact that if food does not look attractive then consumers will probably reject it. Manufacturers add colour so that food appeals to the consumers, but at the same time try to retain its natural looks, as far as possible. Natural appearance is always more tasty than anything that looks unusually coloured. In-fact most consumers believe that colours in foods are their natural colours even though many foods could contain added artificial colours.

Now coming to introduction, Food additives & colours are substances that are wilfully added to food substances to give desired characteristics. They are used for various purposes including preservation, taste masking and sweetening. However, several epidemiological studies have established an association between environmental exposure to various anthropogenic substances and the development of cancer especially, bladder cancer in later life. But there are few food additives that are currently accepted as 'safe' by either the food and drug administration (FDA) or the organization for economic co-operation and development (OECD) are mentioned below-

COLOURS:-

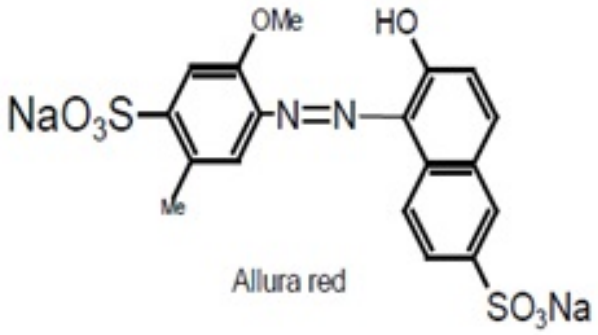
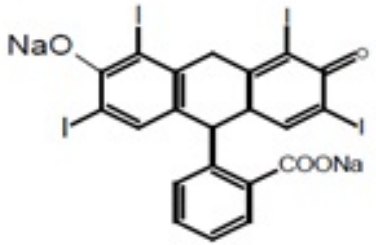
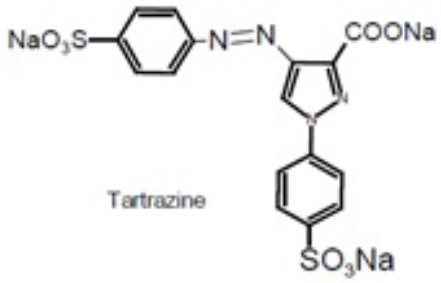
- **Red from: Allura Red.**
- **Yellow from: Tartrazine and Sunset Yellow FCF**
- **Blue from: Brilliant Blue FCF**
- **PINK from: Erythrosine.**

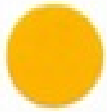
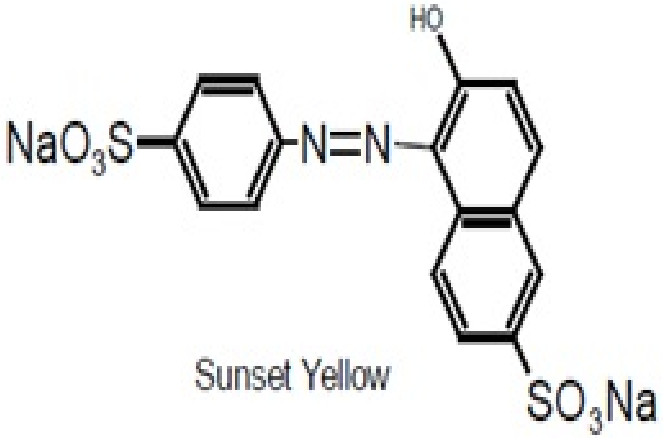
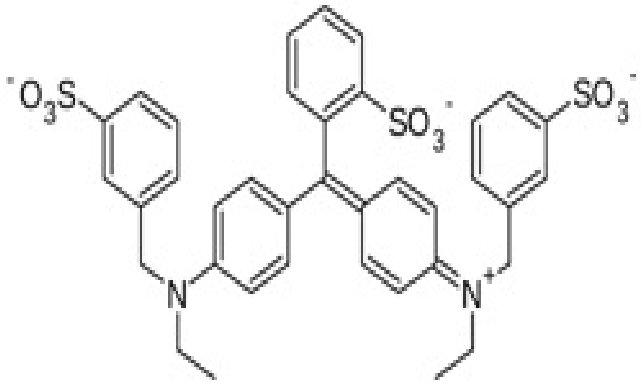
ADDITIVES:-

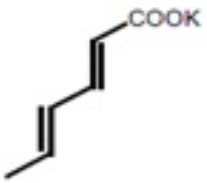
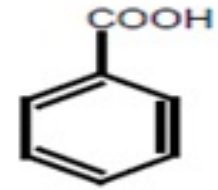
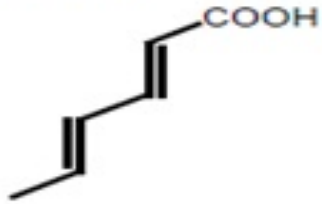
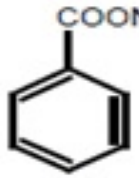
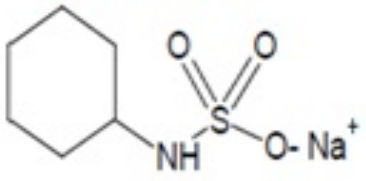
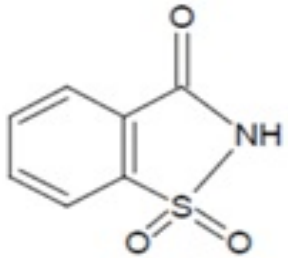
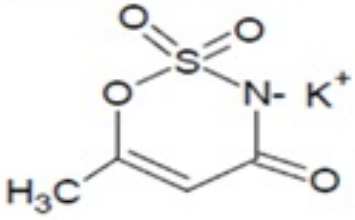
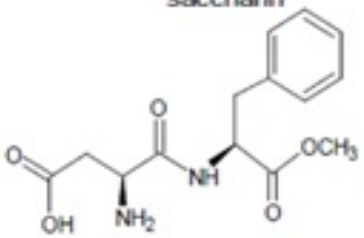
- Preservatives: Benzoic acid & Sodium benzoate and Sorbic acid & Sorbate
- Sweeteners: Acesulfame k, saccharin, sodium cyclamate & Aspartame

ADI (Acceptable Daily Intake) of these colors and Additives

COLOUR & ADDITIVE NAMES	DAILY INTAKE LIMIT[mg/Kg/bw]
Allura red	**0-0.7**
Erythrosine	**0-0.1**
Tartrazine	**0-7.5**
Sunset yellow FCF	**0-2.5**
Briliant blue FCF	**0-12.5**
Amaranth	**0-0.15**
Benzoic acid	**0-5**
Sodium benzoate	**0-2.27**
Sorbic acid & sorbate	**0-25**
Acesulfame k & saccharin	**0-15**
Sodium cyclamate	**0-11**
Aspartame	**0-40**

COLOUR NAME	COMPOUND STRUCTURE	POSSIBLE ILL EFFECT
Allura Red 	 Allura red	**Allergies, food intolerance, cancer, multiple sclerosis, Cardiac disease and asthma,deficit hyperactivity disorder, brain damage & nausea etc.**
Erythrosine 	 Erythrosine	**A skin rash. Severe stomach pain,Pale poo with dark pee,Nausea, vomiting, diarrhea, stomach pain/cramping, and loss of appetite etc.**
Tartrazine 	 Tartrazine	**Anxiety,Migraine,weakness, indigestion,patches on skin and few case of thyroid cancer also recorded.**

COLOUR NAME	COMPOUND STRUCTURE	POSSIBLE ILL EFFECT
Sunset Yellow FCF 	 Sunset Yellow	It aggravates allergies, urticaria rhinitis, nasal congestion, kidney tumors, chromosomal damage, abdominal pain, nausea and vomiting, indigestion, distaste for food.
Brilliant BlueFCF 		Irritating to the skin of humans and to the eyes of rabbits,cancer, malignant tumors, asthma, and hyperactivity

COLOUR NAME	COMPOUND STRUCTURE	POSSIBLE ILL EFFECT
PRESARVATIVES	 Potassium sorbate  Benzoic acid  sorbic acid  Sodium benzoate	Asthma, bronchitis, Cause problem within young children like hyperactive behaviour, weaken heart tissues which is dangerous especially for the aged people etc.
SWEETENERS	 sodium cyclamate  saccharin  acesulfame K  Aspartame	Artificial sweeteners can impact your brain,gut health.Retrain your taste buds,Sweeteners may be linked to a host of gastrointestinal issues also Headache, depression, increased risk of cancer, and weight gain due to increased appetite.

Results from discussion indicate that food colour affects the consumer's ability to correctly identify flavour, to form distinct flavour profiles and preferences, and dominates other flavour information sources, including taste. Exposure to the marketing of unhealthy foods and beverages is a widely acknowledged risk factor for the development of childhood obesity and non-communicable diseases. Food marketing involves the use of various techniques to influence children's food attitudes, preferences and consumption. Best alternatives to minimize the use of synthetic colours and preservatives are the use of natural occurring colours, which is highly recommended.

There are no doubts that nature is highly rich in colour pigments but the main drawbacks of this colour is the chemical stability i.e. natural pigments are affected by several external factors, such as pH, temperature, light, oxygen, solvents, presence of enzymes, proteins and metallic ions, as well as their structure and concentration used. To overcome this issue various experiments have been carried out to provide new and highly specific sources and procedures to improve the extraction efficiency and related stability of those naturally occurring pigments. In parallel with this, increasingly effective techniques are needed to retain the stability of natural food pigments and to ensure the final attractiveness of enriched-foodstuffs, during the manufacturing and processing practices.

Overall, and despite the current advances in the field of food science, many other natural sources of food pigments need to be assessed for their colouring properties, whereas for the current ones, sufficient quantities should become available mainly by industrial extraction and subsequent use.

CHEMISTRY AND NATURE

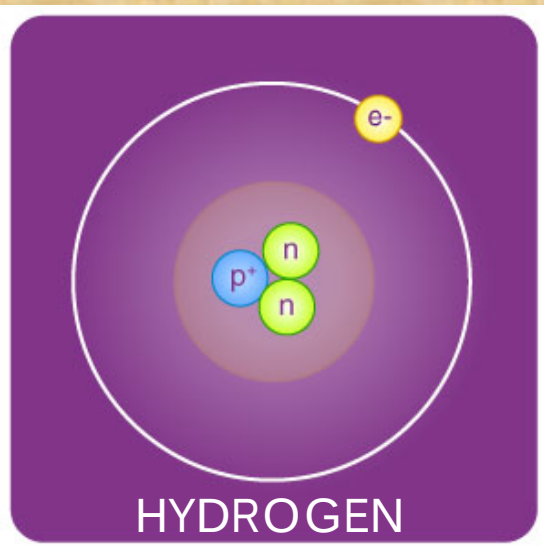
--- Debsourav Pal
2019-2022

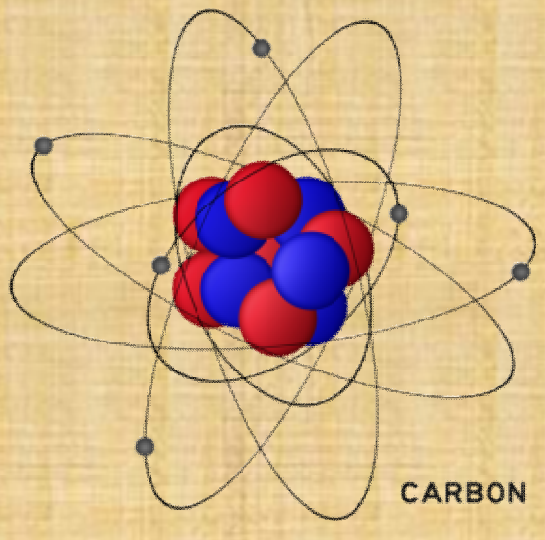
Chemistry means mystery of chemicals, this mystery varies with chemicals structure, nature and most important variety is its reaction and stability in different condition. These various characteristics of chemical compounds or molecules give a beautiful and mysterious outcome . If we deeply think and observe, then we discover that, our mysterious nature is representation of chemicals dramatical play. Actually we surrounded from everywhere by chemistry. From Morning to night which we do, what we use and what we eat, everything is highly related with it. Whole things are made by chemical ingredients and these are in form of liquid, solid or gas.

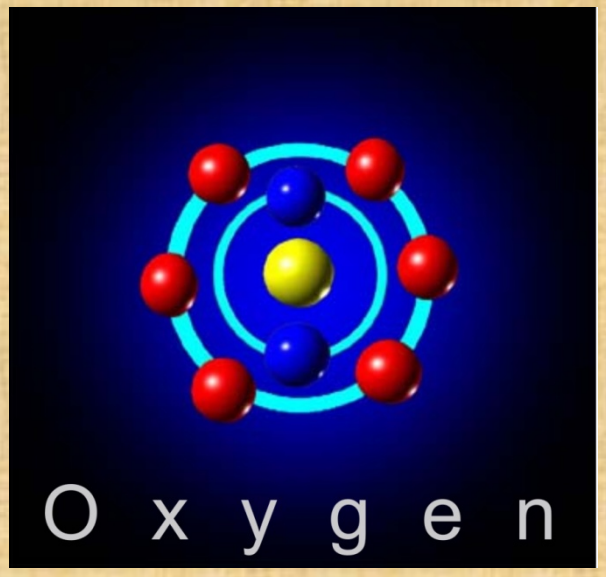
Involvement of chemistry in nature

Chemical laws describe the changes that take place in nature, and chemistry is deeply involved in the profound social changes of the past centuries. Now if we investigate the small things for form a living species of nature, then what we discover, that is "carbon". Again, if we observe the dependence of every living species in nature, it will be "Oxygen“ and Hydrogen. So, we see that main important element for living species is Oxygen, Hydrogen and Carbon. In addition to this many other essential elements are also required.

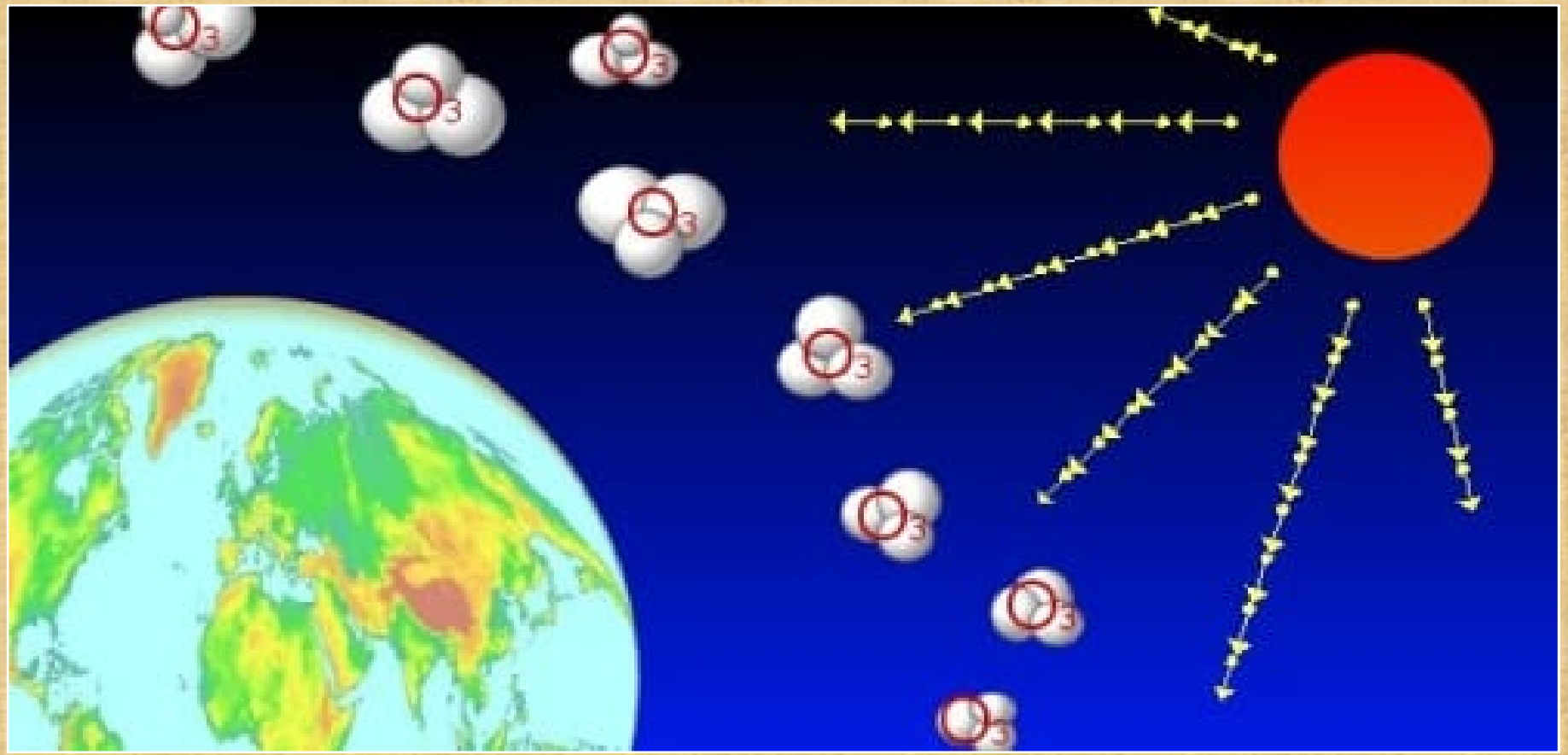
• Formation of every living and non-living species made by various chemicals and minerals. Living species like- animal have bone which made by calcium and other parts which made by fatty or non-fatty acids. Now, Plants are composed of water, carbon-containing organics, and non-carbon-containing inorganic substances such as potassium and nitrogen. Non-living things are made by minerals like -rocks are made by silicon, water is composition of hydrogen and oxygen (H_2O) and soil is mixture of Air, water, minerals, and organic matter (living and non-living) this basic ingredients.

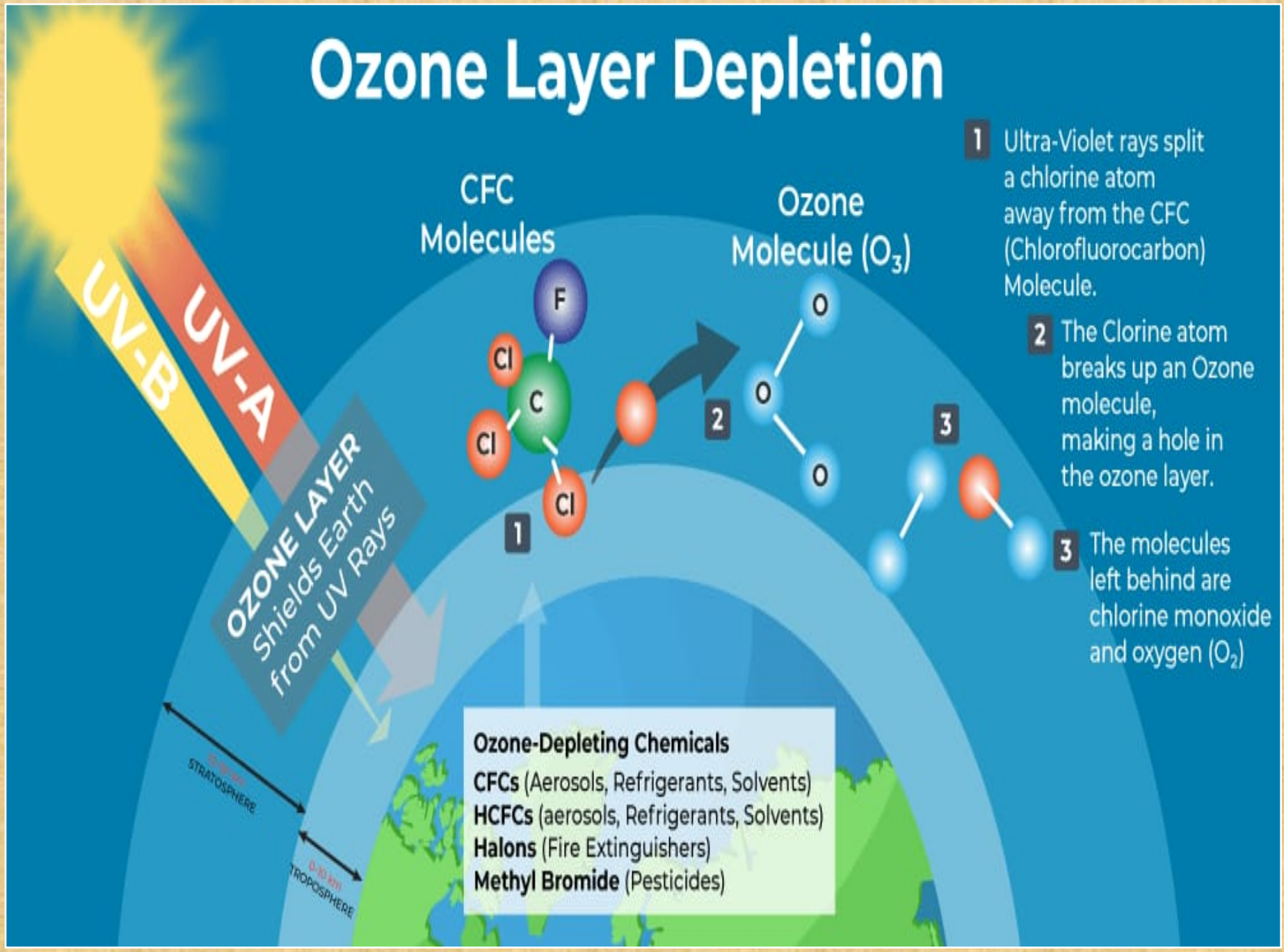






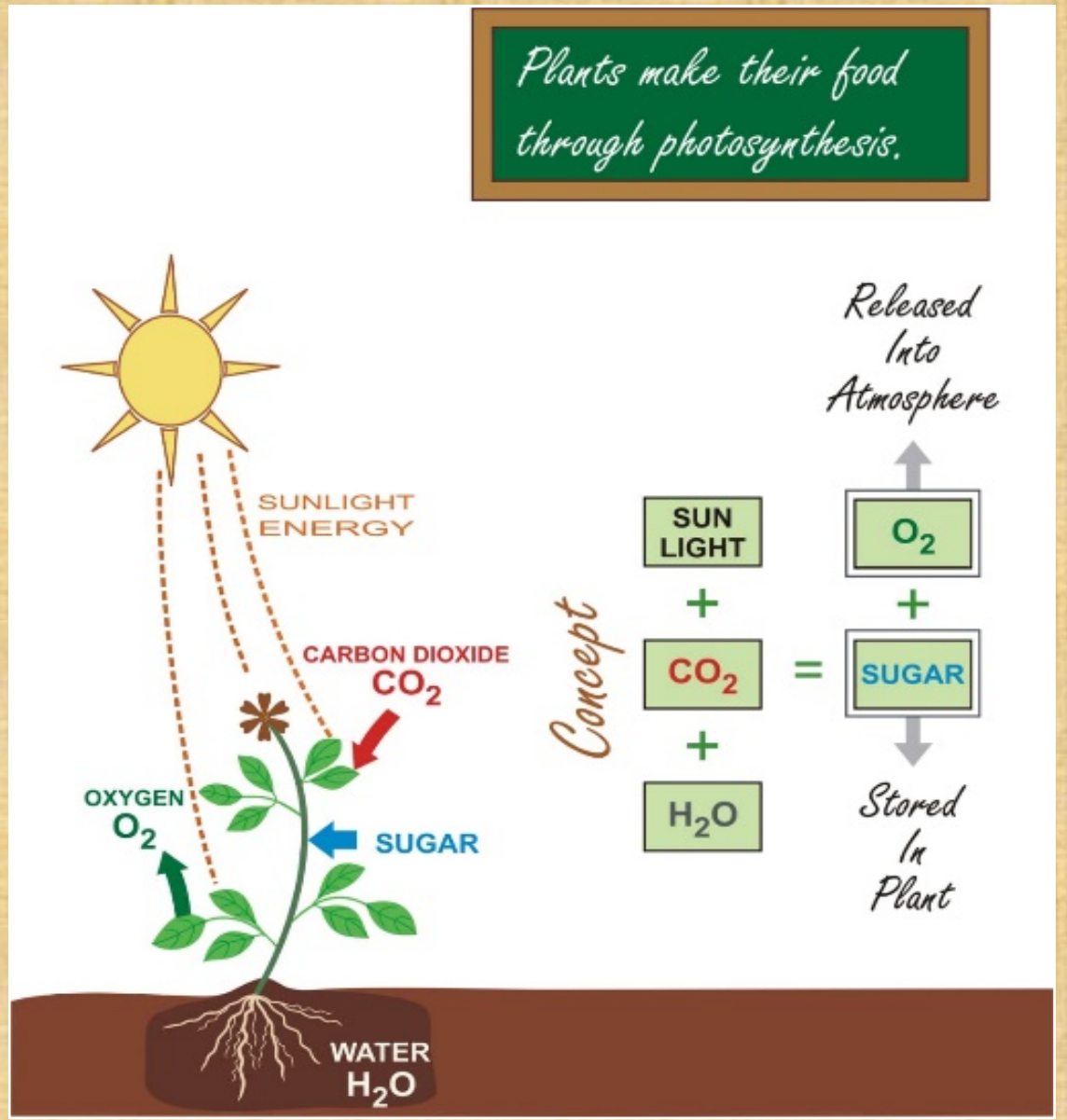
• **Let's see how chemistry glorify nature. It's start from beautiful sunshine in morning. Nature done its essential work in presence of sunlight. The sunlight helps to facilitate growth of every living species. In this sunlight not only suitable lights present, in addition many other harmful light presents. But we don’t effected by these harmful light, because of a chemical molecule, that is "Ozone". This ozone molecule made a layer in stratosphere around 35 km altitude. This layer possess like a shield of warriors on earth. It absorbs mostly harmful ray which comes from sun like-UV A, UV B and UV C lights. But in present days a hole form in ozone layer due to CFC which is produced from refrigerator and AC.**

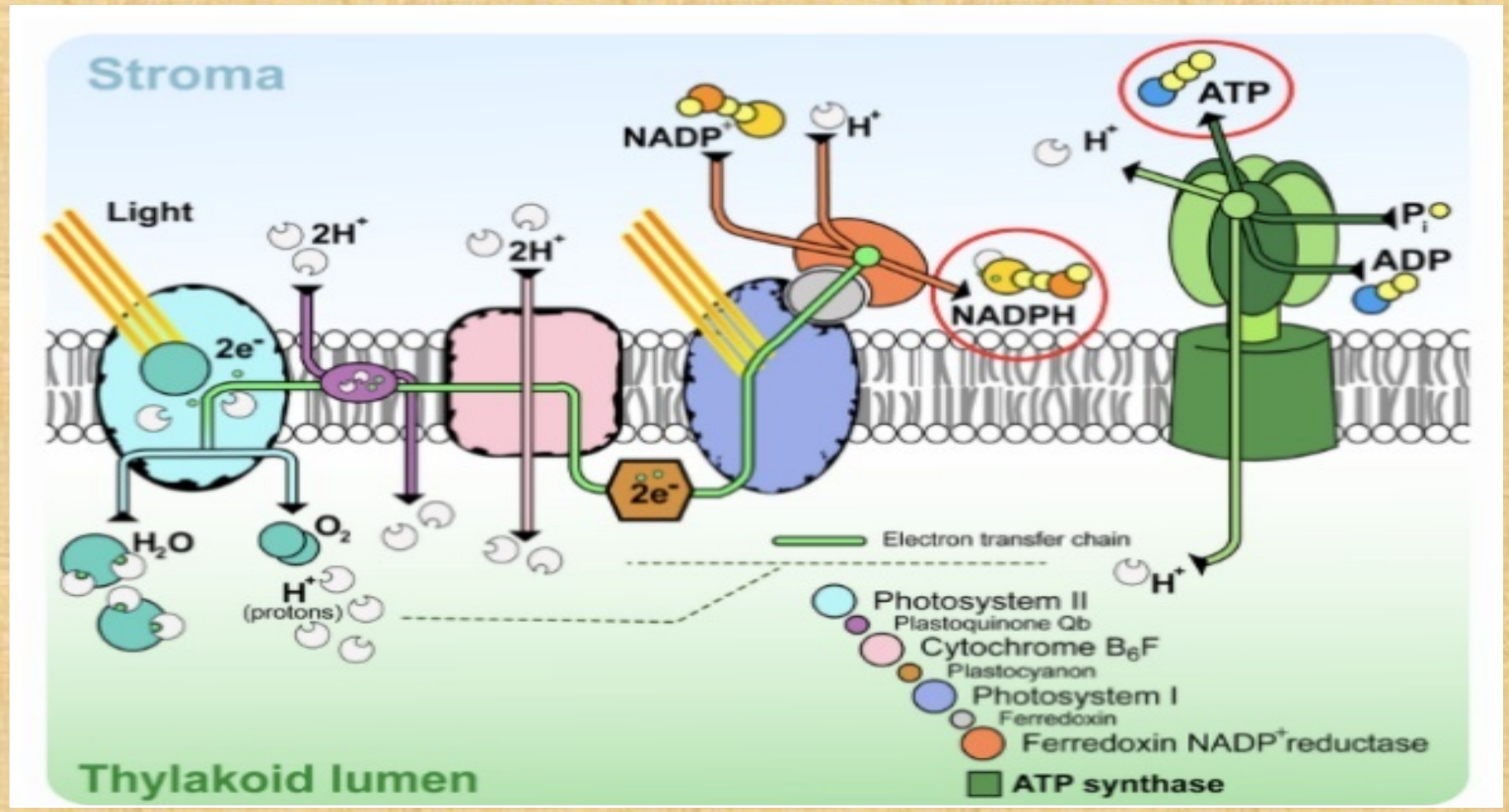



Ozone Layer Depletion
CFC Molecules
Ozone Molecule (O_3)
1 Ultra-Violet rays split a chlorine atom away from the CFC (Chlorofluorocarbon) Molecule.
2 The Clorine atom breaks up an Ozone molecule, making a hole in the ozone layer.
3 The molecules left behind are chlorine monoxide and oxygen (O_2)
UV-A
UV-B
OZONE LAYER Shields Earth from UV Rays
F
Cl
C
Cl
Cl
O
O
O
1
2
3
STRATOSPHERE
TROPOSPHERE
Ozone-Depleting Chemicals
CFCs (Aerosols, Refrigerants, Solvents)
HCFCs (aerosols, Refrigerants, Solvents)
Halons (Fire Extinguishers)
Methyl Bromide (Pesticides)

Chemistry with plants

Plants are main controller of nature; this control is maintained by changing in chemical behaviour. Now see how plants make their food. Plants are called producers because they make – or produce – their own food by photosynthesis. Inside the plant cell there are small organelles called chloroplasts, which store the energy of sunlight. In chloroplast there is a light-absorbing pigment present called chlorophyll. Their roots take up water and minerals from the ground and their leaves absorb a gas called carbon dioxide (CO_2) from the air. They convert these ingredients into food by using energy from sunlight. This process is called photosynthesis, which means 'making out of light'. The foods are called glucose and starch.



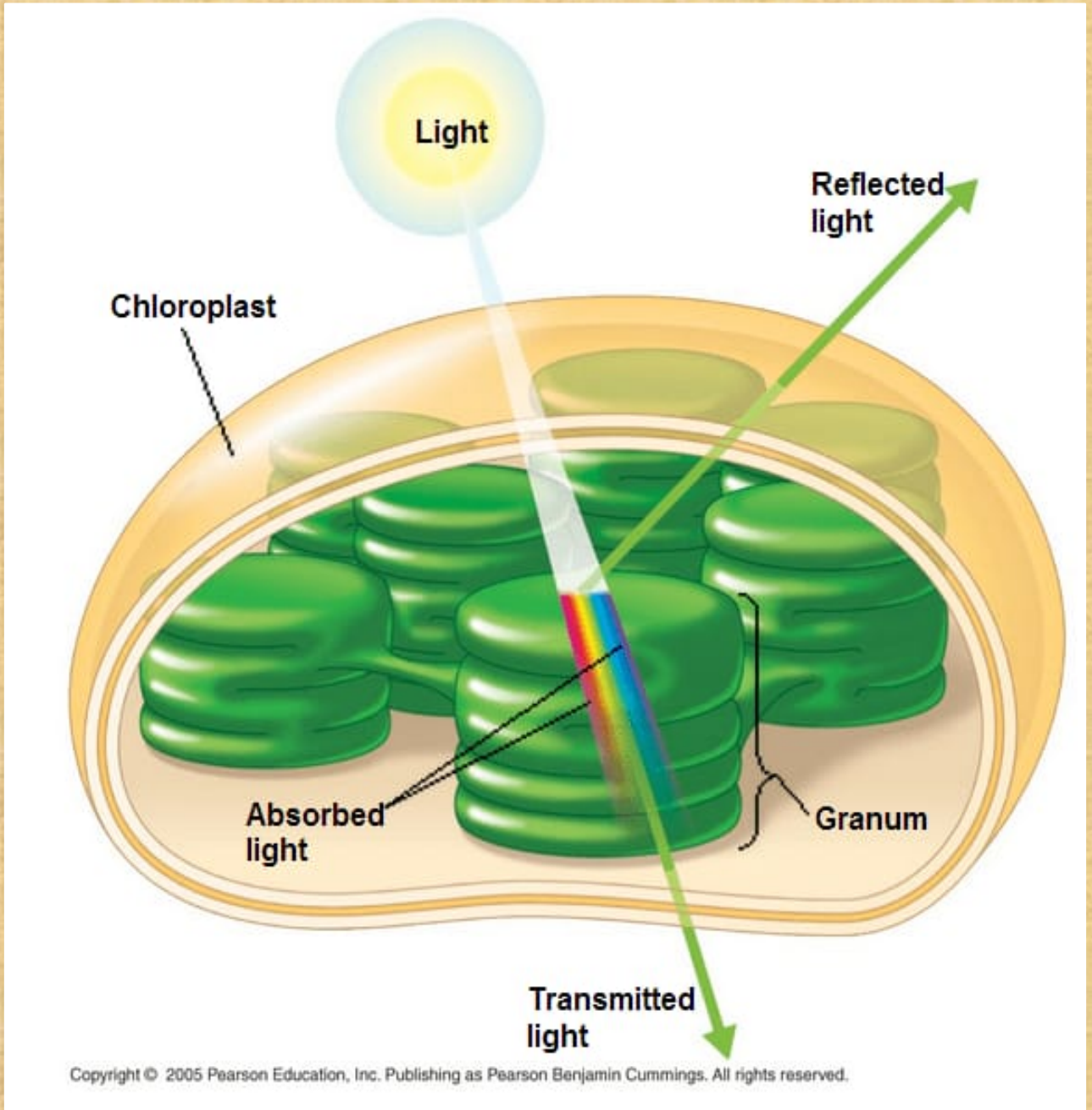


Chemical Equation

$$6CO_2 + 6H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2$$

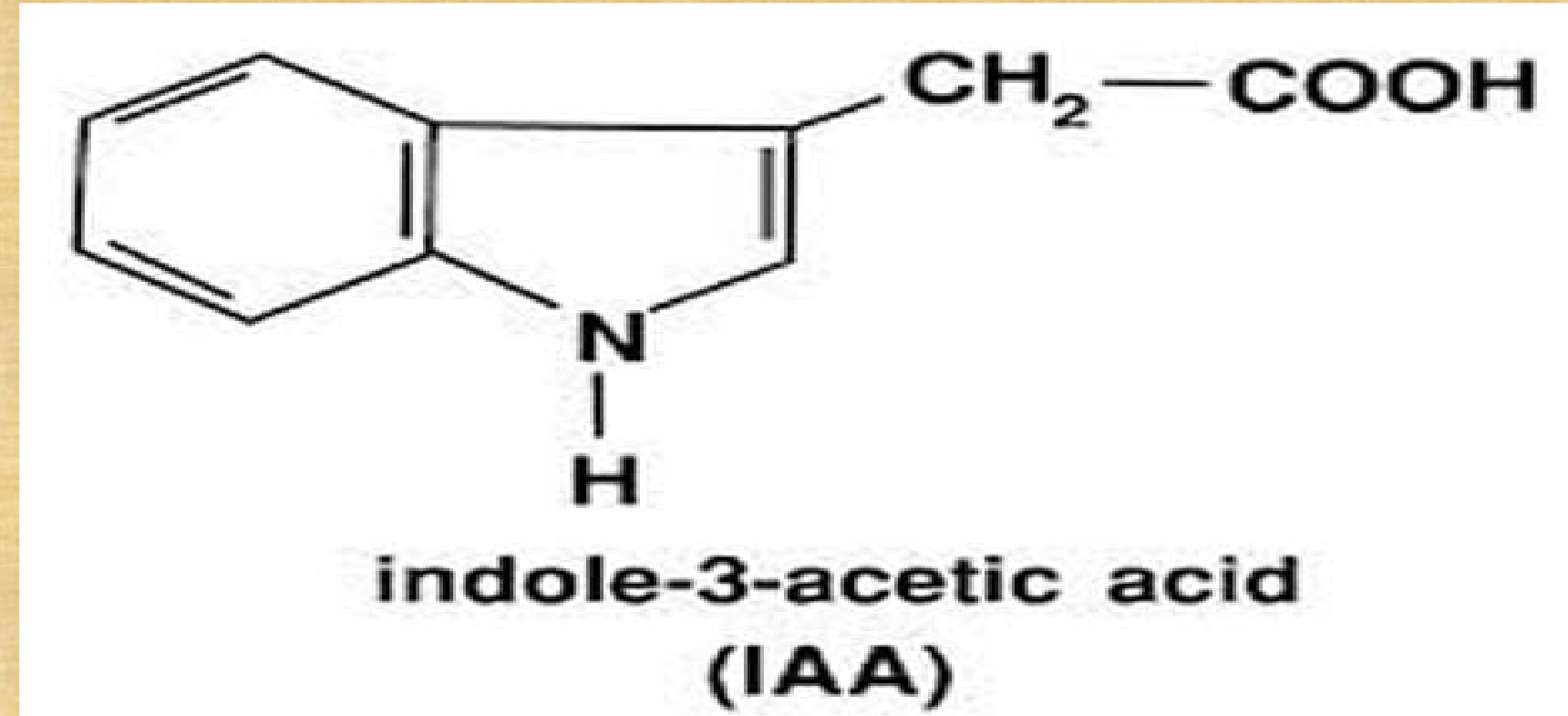
Chemistry behind colour

of plants. Maximum plants are have green colour in nature. Chlorophyll [a complex of Mg(II)] is responsible for the green colour of many plants.Aleaf absorbing blue and red light, but reflecting green light. Plants are perceived as green because chlorophyll absorbs mainly the blue and red wavelengths but green light, reflected by plant structures like cell walls, is less absorbed.

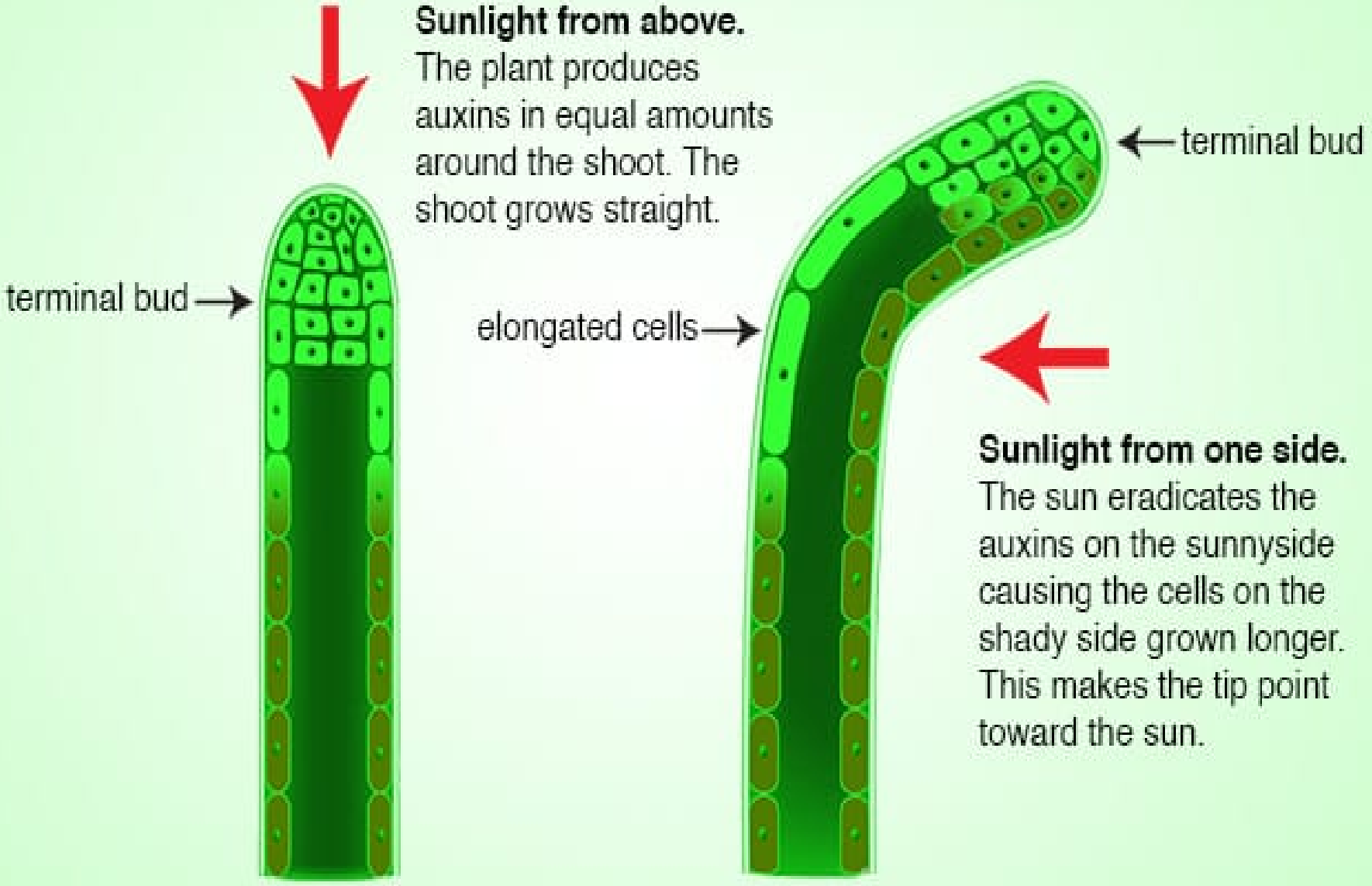


Growth of Plant

If we investigated about plants growth, then, again we found a chemicalcompound that is "auxin" in addition of many other compounds. Its chemicals name is indole-3-acetic acid. Basically, Auxins are a powerful growth hormone produced naturally by plants. They are found in shoot and root tips and promote cell division, stem, and root growth. They can also drastically affect plant orientation by promoting cell division to one side of the plant in response to sunlight and gravity.



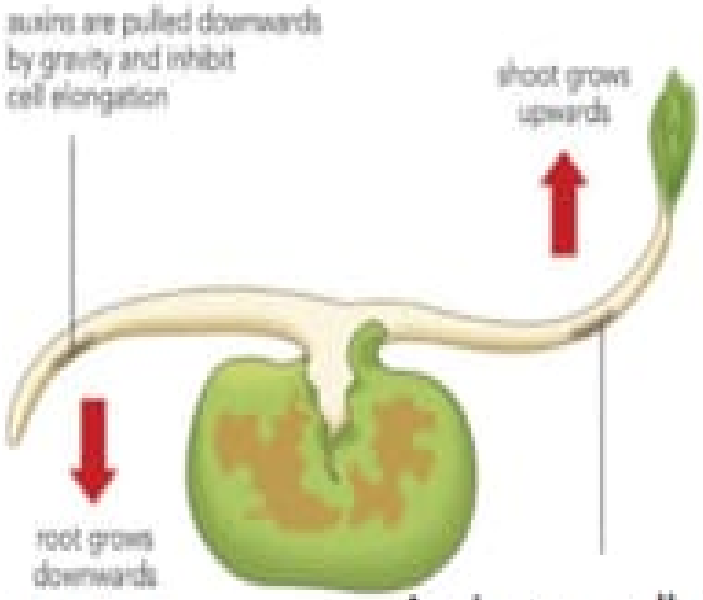
Auxin eradication causes a terminal bud to point toward the sun.



Sunlight from above.
The plant produces auxins in equal amounts around the shoot. The shoot grows straight.

Sunlight from one side.
The sun eradicates the auxins on the sunnyside causing the cells on the shady side grown longer. This makes the tip point toward the sun.

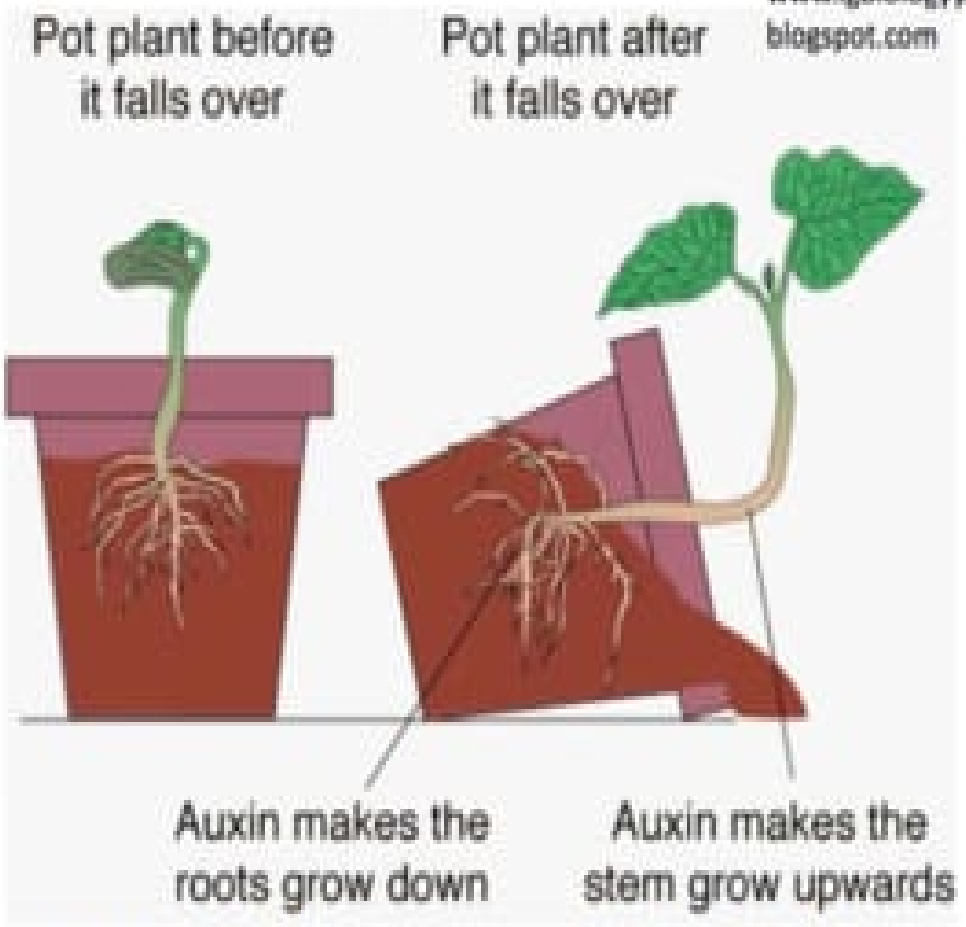
Geotropism is growth response to gravity. Shoots grows away from gravity, roots towards gravity



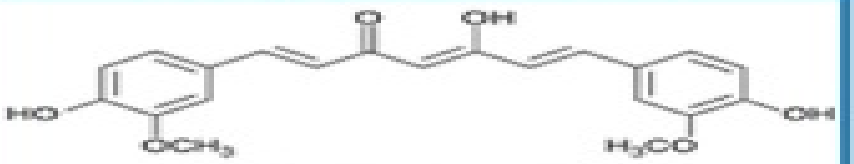
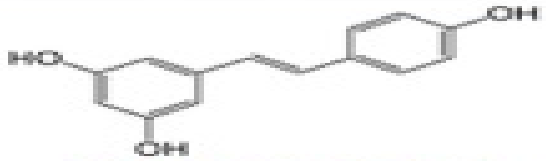
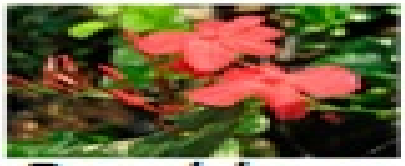
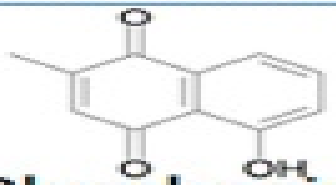
Auxins in roots **decrease** cell elongation

Auxins are pulled downwards by gravity and **increase** cell elongation

www.slideplayer.com (Ami Owens)

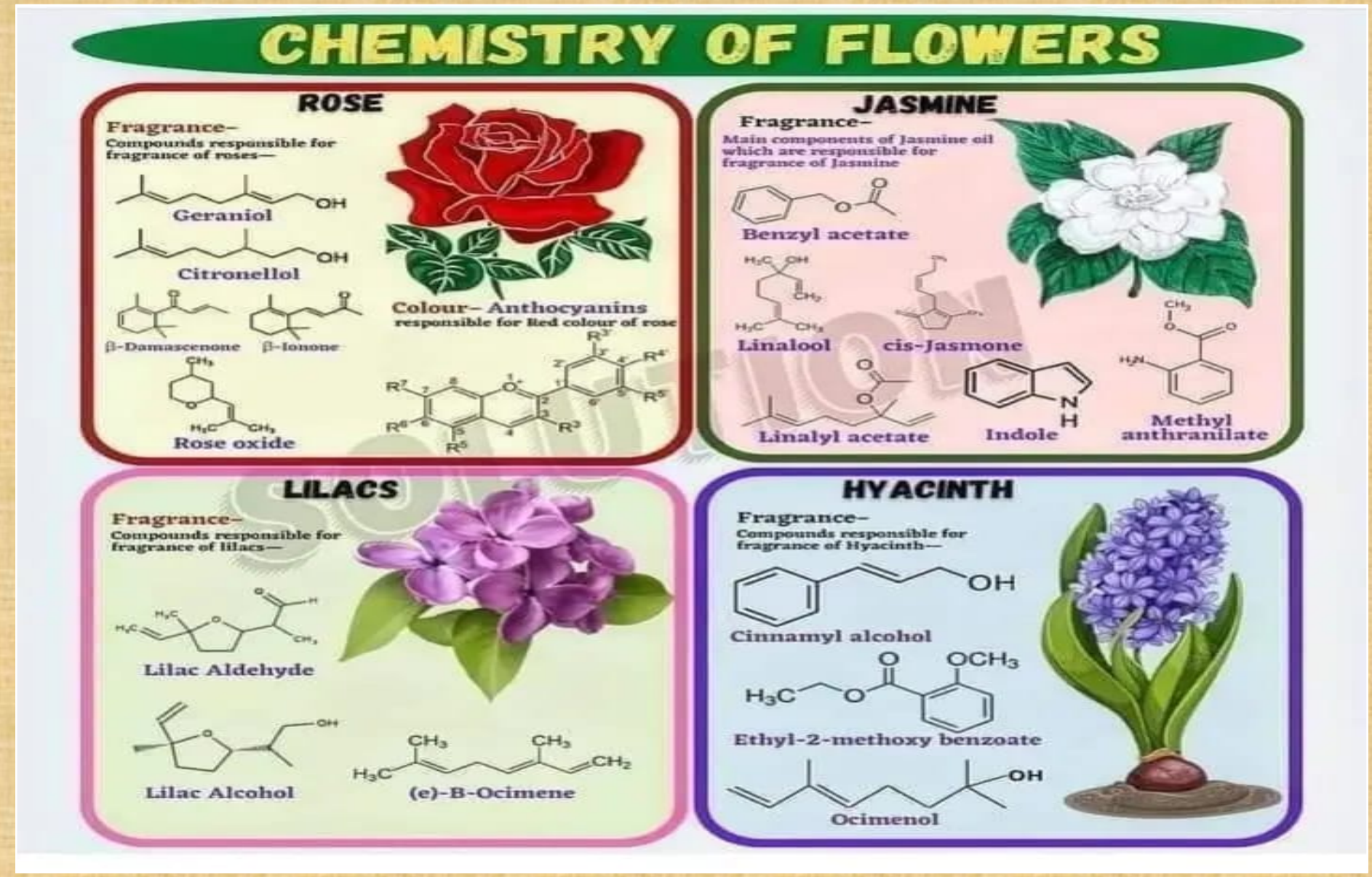


We directly not produce food, that's why we take it from plants as fruits, vegetable, grains etc. These fruits and vegetables are made by many chemical compounds and minerals, like- Fiber, Sugar, Glucose, Zink, Calcium, Potassium, Magnesium etc.

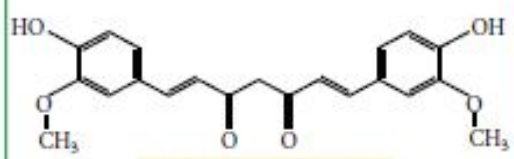
Source	Phytochemical
 Turmeric	 Curcumin
 Grapes	 Resveratrol
 Tea	 EGCG
 Magnolia	 Honokiol
 Pumblago	 Plumbagin

Flower Chemistry

Flowers and its fragrance are gift of chemistry. It is volatile aromatic organic compounds which gives beautiful fragrance.

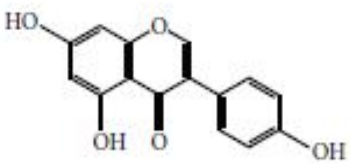


Curcumin



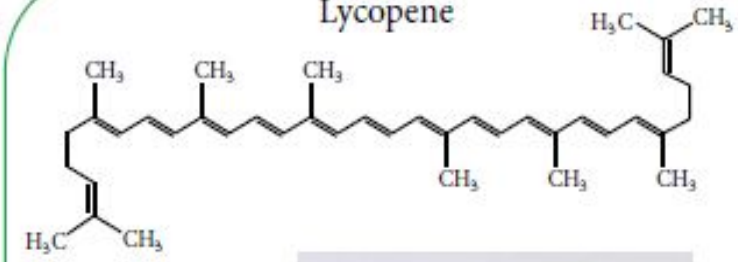
Turmeric powder

Genistein



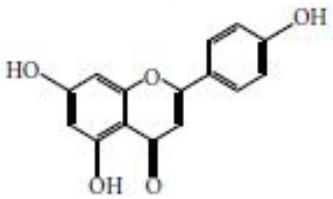
Soybeans

Lycopene



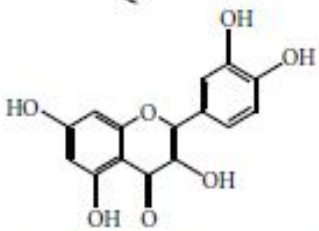
Tomatoes, guava, watermelon, and papaya

Apigenin



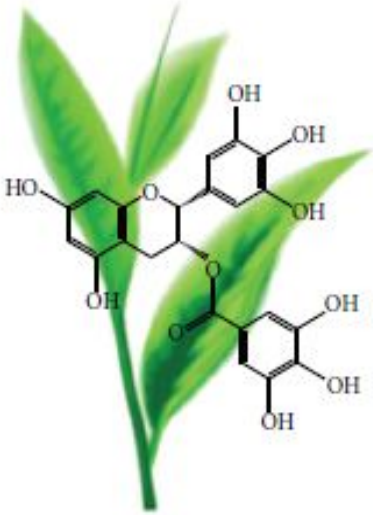
Chamomile tea

Quercetin



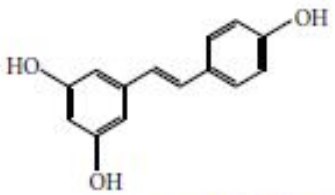
Fruits, vegetables, leaves, and grains

Epigallocatechin-3-gallate (EGCG)



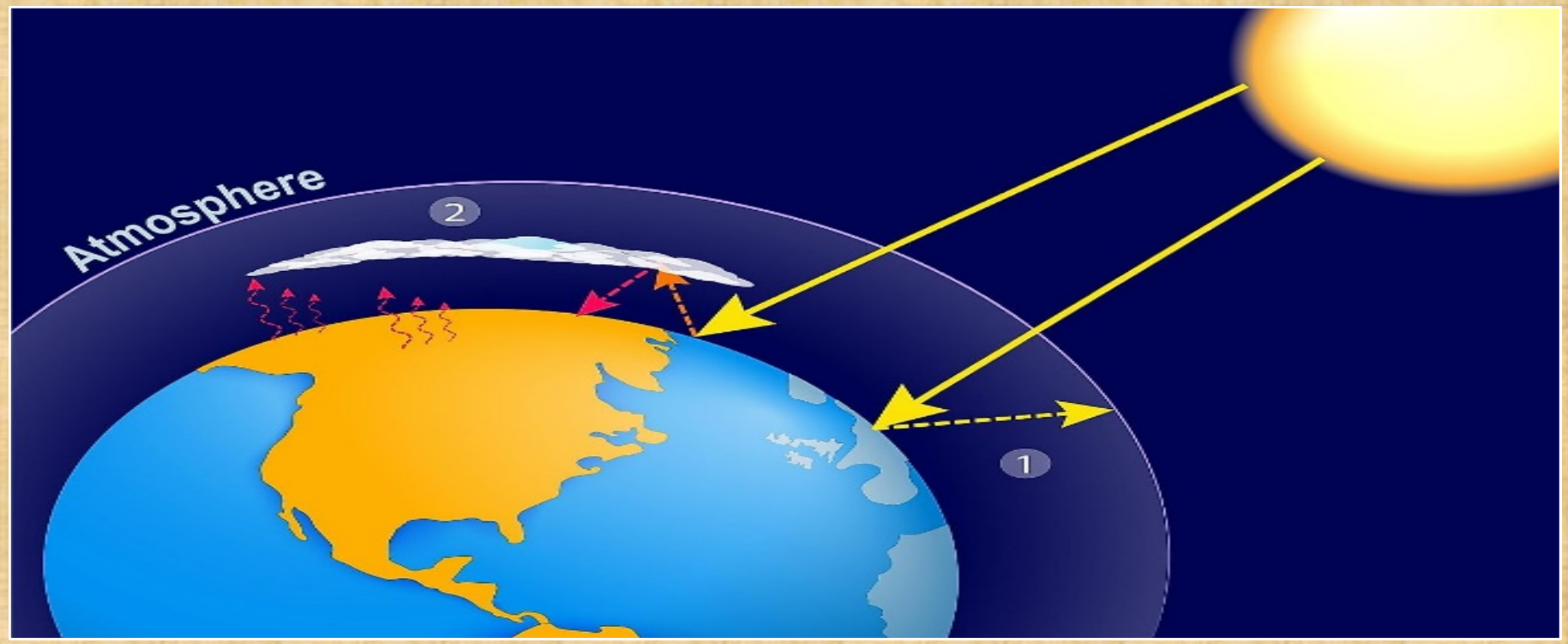
Green tea

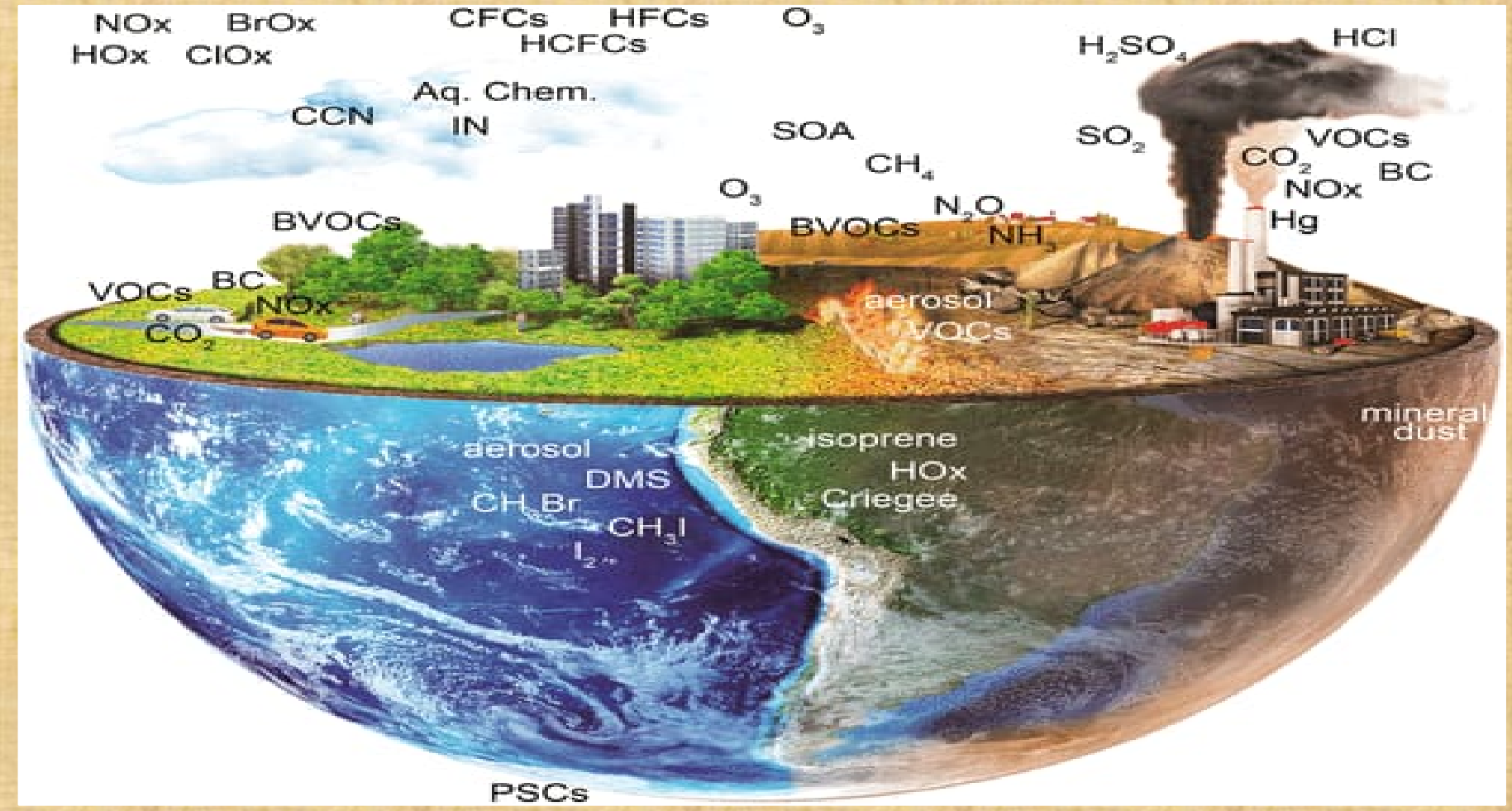
Resveratrol



Grapes mainly in the skin

One of the main components of Earth's interdependent physical systems is the atmosphere. An atmosphere is made of the layers of gases surrounding a planet or other celestial body. Earth's atmosphere is composed of about 78% nitrogen, 21% oxygen, and one percent other gases. These gases are found in atmospheric layers (troposphere, stratosphere, mesosphere, thermosphere, and exosphere) defined by unique features such as temperature and pressure. The atmosphere protects life on earth by shielding it from incoming ultraviolet (UV) radiation, keeping the planet warm through insulation, and preventing extremes between day and night temperatures. The sun heats layers of the atmosphere causing it to convict driving air movement and weather patterns around the world.





So, it concluded that, we see how everything in nature related with chemistry and by various way it influences the nature. Our earth and its atmosphere both are included in nature. In this nature everything is related by some chemical relation. chemistry is the base of this complexly form nature. It allows how a flower can bloom and it decided how nature benefited by this flower. It helps to growth, development and creation of living and non-living species and it demolished them.

The End